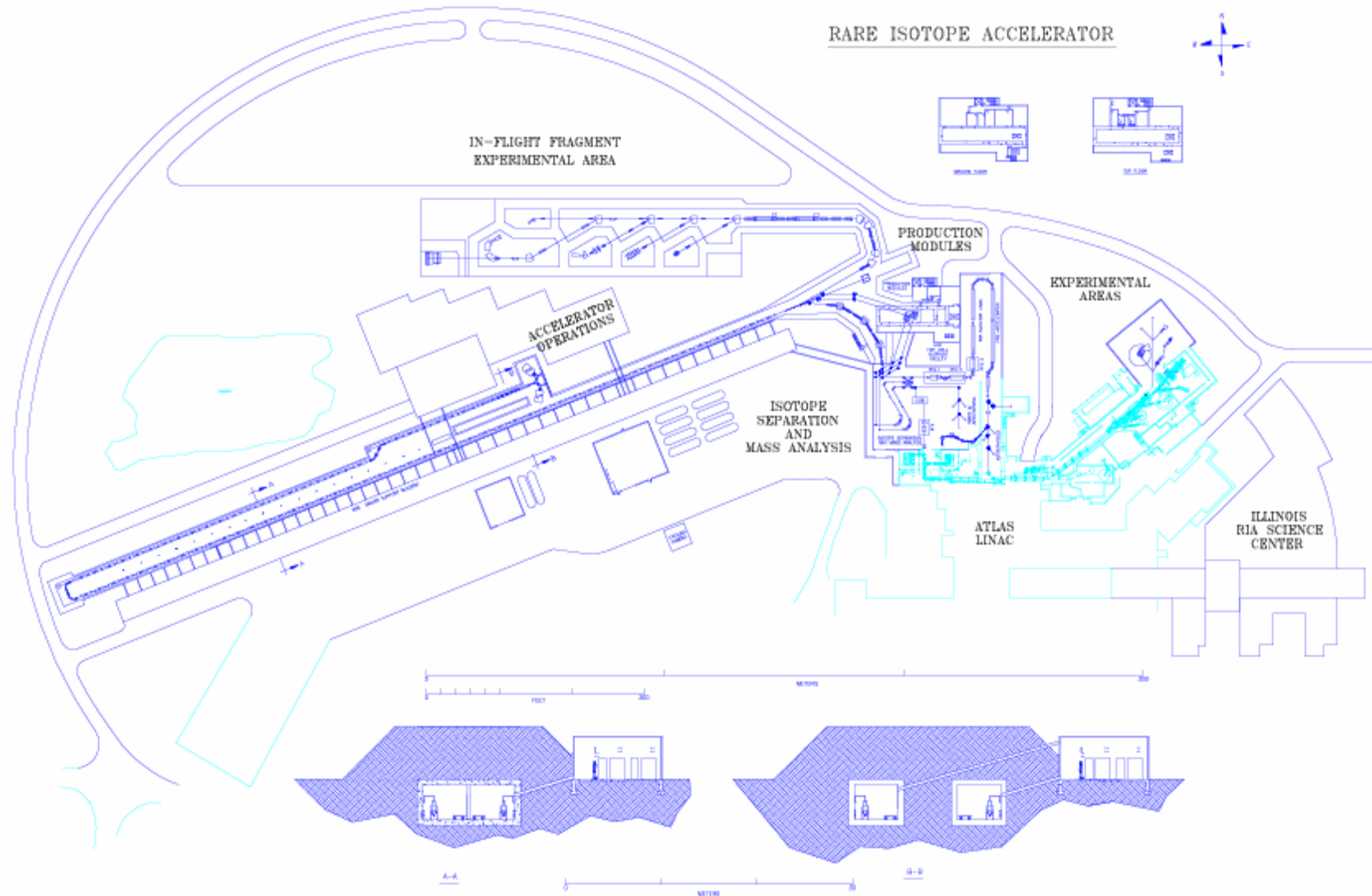


Summary of RIA Conventional Facilities Cost Estimates

Schematic of the RIA Facility Layout – ANL Site



Overview of RIA Conventional Facilities



ARCHITECTURE
INTERIOR DESIGN
PLANNING



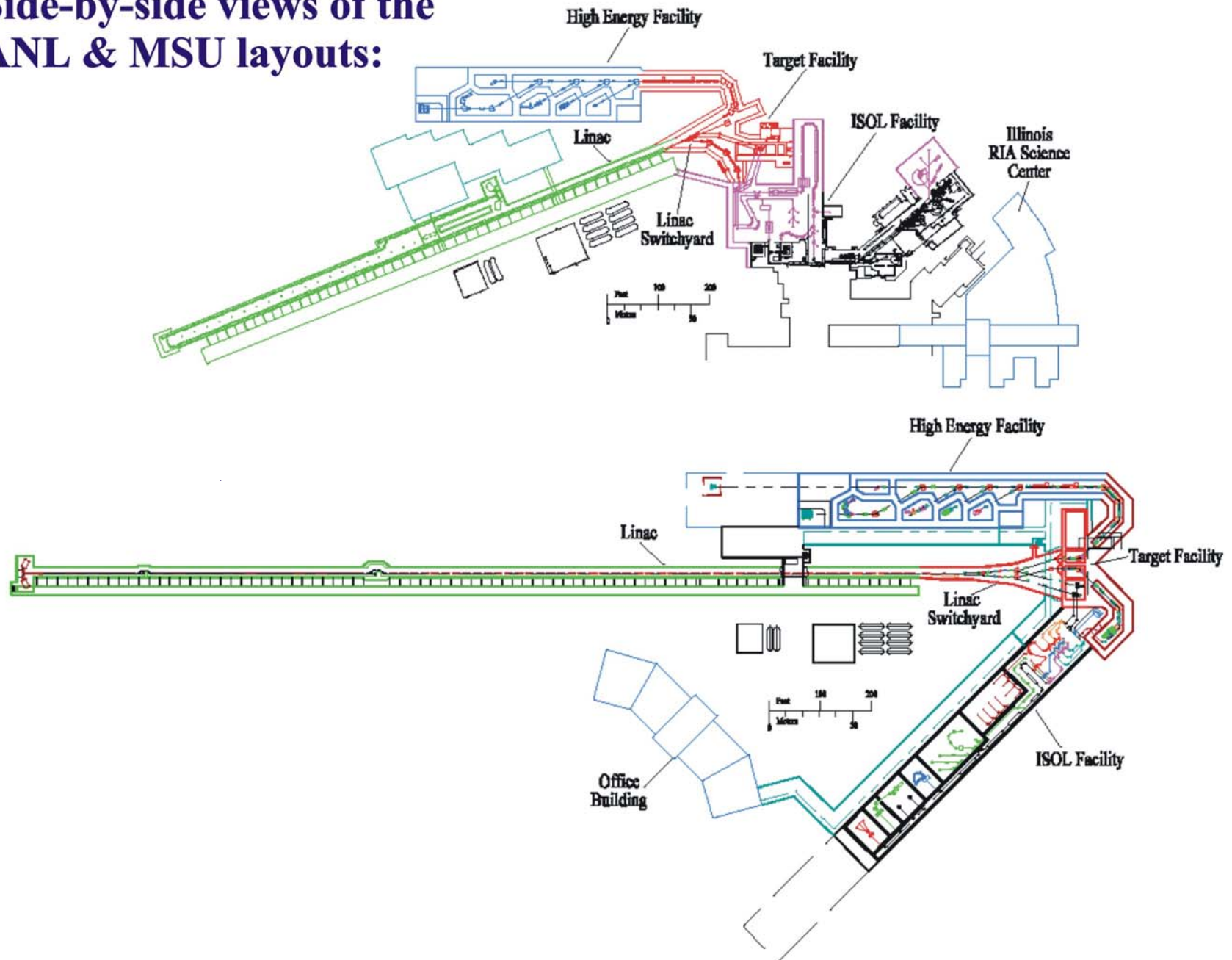
arete' 3 ltd
18645 SOUTH WEST CREEK DRIVE
TINLEY PARK ILLINOIS 60477
708.342.1250 FAX 708.342.1240

SITE PLAN

 ARGONNE
NATIONAL LABORATORY

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Side-by-side views of the ANL & MSU layouts:



Cost estimating procedure

- Arete-3: A/E firm in Orland Park, IL, made preliminary layouts.
- Thomason-Clark: Cost-estimating engineers in Schaumburg, IL, specified construction and estimated cost to ~10%.
- Sargent & Lundy: International engineering firm based in Chicago, further improved Thomason-Clark estimates.

Comparison of ANL & MSU Estimates

Description	Estimated Cost (\$M) (without contingency)	
	ANL	MSU
Driver Tunnel	\$ 11.3	\$ 12.0
Klystron Hall	\$ 6.2	\$ 6.4
Driver Distribution and Fragment Separator	\$ 9.9	\$ 15.7
Target Gallery & Hot Cell Support	\$ 8.7	\$ 15.7
Low Energy Experimental Area	\$ 17.1	\$ 15.0
High Energy Experimental Area	\$ 13.5	\$ 13.1
Support Facilities (Laboratories & Shops)	\$ 11.7	\$ 11.8
Helium Compressor & Refrigeration	\$ 3.9	\$ 3.9
Pedestrian Link	\$ 0.9	
Site Work	\$ 15.1	\$ 11.7
Subtotal (before contingency):	\$ 98.3	\$ 105.4
With 20% contingency:		
	118.0	126.5

Summary of Conventional Facilities Cost Estimate

Summary of Conventional Cost Estimates for RIA at ANL							
		A/E cost		\$/sq. ft.	cost w/ EDIA & PM	\$/sq. ft. w/ EDIA & PM	\$/sq. ft. w/ 20% cont.
		estimate	Sq. ft.	constr.	8%,2%,2%,1.5%		
		(constr. only)		only	x 1.14 overall		
		(k\$)			(k\$)		
RIA Support (RSB)		\$10,297	60,000	\$172	\$11,743	\$196	\$235
Driver Tunnels (DBA & DBB)		\$9,908	34,700	\$286	\$11,300	\$326	\$391
Driver Beam Xport and FRS		\$8,639	17,000	\$508	\$9,853	\$580	\$696
Target and Hot Cell Support (HSF & THC)		\$7,646	23,000	\$332	\$8,720	\$379	\$455
Low Energy Area (LET, PAB, EXT, EXA, PRI, ISA)		\$5,065	24,500	\$207	\$5,776	\$236	\$283
FRAGMENT Facility (FEX)		\$11,850	54,000	\$219	\$13,515	\$250	\$300
Experimental Area 5 (EXV)		\$1,586	7,500	\$211	\$1,809	\$241	\$289
Driver Support Building (DSB) [Klystron Gallery]		\$5,437	30,600	\$178	\$6,201	\$203	\$243
He Compressor and Refrigeration (HCB & HRB)		\$3,435	9,000	\$382	\$3,918	\$435	\$522
Pedestrian link		\$816	3,700	\$220	\$930	\$251	\$302
Sub Total		\$64,679	264,000	\$245	\$73,765	\$279	\$335
Site Work		\$13,212			\$15,068		
Total (before contingency)		\$77,890			\$88,833		
Add 20 % contingency (10% for scope, 10% for cost)				Total:	\$106,599		
Exisitng square footage at ATLAS not included in the above:			38,000		\$11,400		\$300
		Total:	302,000	Value:	\$117,999		

Summary of MSU Estimates for Conventional Facilities

Description		MSU Sq. Ft.	Cost per Sq. Ft.	MSU Cost, \$M
Driver Tunnel		36,800	\$326	\$12.0
Klystron Building		31,700	\$203	\$6.4
Driver Distribution + Fragment Separators		32,600		\$15.8
3a - Driver Dist.	12,400		\$326	
3b - Fragment Separators	20,200		\$580	
Target Gallery + Hot Cell Support		41,500	\$379	\$15.7
4a - Target Gallery	24,400			
4b - Hot Cell Support	17,100			
Low Energy Experimental Area		63,400	\$237	\$15.0
5a - Existing Atlas				
High Engery Experimental Area		54,000	\$242	\$13.1
Support, Lab/Shop		60,000	\$196	\$11.8
He Compressor and Refrigeration		9,100	\$432	\$3.9
Pedestrian Link			\$251	\$0.0
Site				\$11.7
Totals	(without contingency)	329,100		\$105.4
			Total cost with contingency:	\$126.5

Systems Common to All Buildings

- Fire Alarm Systems
 - Fire alarm equipment and connections
- Telephone/Data System
 - Telephone terminal board, outlets, and empty conduits
- Security System
 - Security equipment and connections
- Site Wide Paging System
 - Site wide paging equipment and connections
- Lightning Protection System
 - Lightning protection equipment and connections

RIA Support Building

- A building housing SRF facilities, and accelerator operations
 - 60,000 ft² @ \$196/ ft² = \$11.7 M
 - Consisting of:
 - 1 story high bay- 9000 ft² SRF facility built on 8” slab w/5T crane
 - 2 story Office/Lab
 - » Lab/Storage 44@ 800 ft²
 - » Offices for 100 people – 10,000 ft² built on 6” slab on grade
 - 1 story Driver Beam Access – 2000 ft² built on 24” slab w/5T crane
 - Exterior - 20% Brick, 50% architectural metal panels, & 20% glazing
 - Electrical Power
 - 5800 kW @ 480V 3 ϕ Includes switchgear, transformers, breaker panels,
 - lighting, and distribution
 - HVAC
 - Heating provided by Central Lab Steam Plant, AC - electric water chillers

Driver Tunnels

- $34,700 \text{ ft}^2 @ \$391 / \text{ft}^2 = \11.3 M
 - Located below grade-houses Driver Linac, cut and fill construction
 - $\sim 500 \text{ m L.} \times 7 \text{ m W.} \times 4 \text{ m H.}$
 - Covered with 7 meters dirt
 - 2' thick concrete slab base
 - 2' thick concrete walls
 - 2' thick concrete ceiling
 - 7 emergency egress/access points
 - De-watering system under with waterproof membrane
- Electrical Power
 - 200 kW @480V 3 ϕ includes switchgear, transformers, breaker panels, lighting, and distribution

Driver Support Building

- 1 story – RF and magnet power supply building for Driver Linac
 - 30,600 ft² @ \$203/ ft² = \$6.2 M
 - ~300 m L. x 10 m W. x 5 m H.
 - 6” concrete slab on grade
 - Exterior : Corrugated metal panels
 - Overhead door for equipment access
- HVAC : standard
- Electrical Power
 - 5800 kW @ 480V 3 ϕ including switchgear, transformers, breaker panels, lighting, and distribution

Driver Beam Transport & Fragmentation Spectrometer Tunnels

- 17,000 ft² @ \$580/ ft² = \$9.9 M
 - Tunnel below grade (cut and fill construction)
 - 2' thick concrete slab floor - 17,000 ft²
 - 2' thick concrete walls - 2,300 ft²
 - 2' thick ceilings - 1,500 ft²
 - 10' thick concrete walls - 7,224 ft²
 - 10' thick concrete ceiling - 15,500 ft²
 - 3 egress/access points
- De-watering System under base with water-proofing
- Electrical Power – 1000 kW @ 480V 3 ϕ
 - Includes switchgear, transformers, breaker panels, lighting, and distribution

Target and Hot Cell Support

- 23,000 ft² @ \$379/ ft² = \$8.7M
 - A 3 level Target Area and 3 level office/lab, 1 level below grade
 - Hot Cell base slab – 10' thick concrete = 2,400 ft²
 - Hot Cell walls – 4' thick concrete = 5,800 ft²
 - Foundation walls – 2' thick concrete = 4,920 ft²
 - Hot Cell ceiling – 4' thick concrete = 5,800 ft²
 - Structural base slab – 2' thick concrete = 5,180 ft²
 - Exterior walls – corrugated metal panels
- De-watering system under foundation with waterproofing membrane
- 10 Ton Bridge Crane costed with remote handling components
- HVAC – separate air handling for target and hot cell area
- Electrical Powe
 - 460 kW @ 480V 3 ϕ includes switchgear, transformers, breaker panels, lighting, and distribution

Stopped and Low Energy Beam Area

- 24,500 ft² @ \$236/ ft² = \$5.8 M
 - 20' tall high bay building
 - 8" thick concrete slab on grade
 - Exterior – corrugated metal panels
 - Overhead door for equipment access
 - Air lock doors
 - Shower provisions
 - 5 Ton Bridge Crane
 - Compressed air and N2 distribution
- HVAC included
- Electrical Power
 - 1700 kW 480V 3 ϕ includes switchgear, transformers, breaker panels, lighting, and distribution

Experimental Area V

- Addition to ATLAS Experimental Areas
 - 7500 @ \$241/ ft² = \$1.8 M
 - A high bay building
 - Exterior – corrugated metal panels
 - 12” concrete slabs on grade – 7500 ft²
 - Overhead door for equipment access
 - 10 Ton Bridge Crane
- HVAC – standard
- Electrical Power:
 - 1000 kW 480V 3 ϕ provided from existing substation

Existing ATLAS Buildings Used by RIA (38,000 ft²):

RIB injector area, Booster and ATLAS Linac tunnels, 3 experimental high-bay areas, control room, data acquisition area. [Value \$9.5M @ \$250/ ft².]

In-flight Fragment Facility

- 54,000 ft² @ \$250/ ft² = \$13.5 M
 - Main function of building is a high-bay experimental area.
 - Exterior – corrugated metal panels
 - 2' thick concrete base
 - 2' thick concrete foundation walls
 - Poured and/or stacked concrete shielding ~4-m thick, supplemented by steel shielding at beam dumps.
 - 4 exits to grade
 - Waterproofing liner to excavation, membrane below slab on grade, below grade walls.
- HVAC- Standard
- Electrical Power
 - 660 kW 480V 3 ϕ includes switchgear, transformers, breaker panels, lighting, and distribution

Helium Compressor & Refrigerator Buildings

- 9000 ft² @ \$435/ ft² = \$3.9 M
 - High bay type buildings
 - Compressor building – 82' L X 76' W X 30' H
 - 5 Ton Bridge Crane
 - Refrigerator building – 57' L X 51' W X 38' H
 - 6" concrete slab on grade – 9000 ft²
 - Overhead doors, for equipment access
- HVAC
 - Steam heat, exhaust fans for cooling and ODH, cooling towers for processed water
- Electrical Power
 - 9000kW @ 13.2 kV includes switchgear, transformers, breaker panels, lighting, and distribution

Pedestrian Link

- $3700 \text{ ft}^2 @ \$251/\text{ft}^2 = \0.9 M
- One story pedestrian link from building 203 to the Driver Support Building
 - 4" concrete slab on grade – 3700 ft^2
- Pre-engineered metal building with corrugated metal panels
 - Overhead door for equipment access
- HVAC – Fan-coil units
- Electrical Power
 - 100kW @ 480V 3 ϕ includes switchgear, transformers, breaker panels, lighting, and distribution

Site Work

- General Site Work, \$7.0 M
 - Site preparation
 - Clear site, grade construction areas, remove existing parking lot
 - Site improvements
 - Paving sidewalks, roads, parking lots, curbs
 - Site mechanical
 - Underground sanitary system, storm system, domestic water, steam, condenser water system
- Site electrical, \$8.1 M
 - 2 circuit – 138 kV transmission line – 15,000'
 - 20 MW substation
 - 10 unit substations for individual buildings
 - High voltage feeds to unit substations – 5500'
 - Site lighting

Summary

- ANL Conventional Construction
 - New construction
 - 264,000 ft², \$107 M (average \$404/ft²) including contingency
 - Existing construction
 - 38,000 ft², \$11.4 M (average \$300/ ft²) including contingency
 - Net area and effective value
 - 302,000 ft², \$118 M (average \$391/ft²) including contingency
- MSU Conventional Construction
 - New construction
 - 329,000 ft², \$127 M (average \$386/ft²) including contingency
 - MSU proposal has more area around the targets